



## Climate change, crop yields, and undernutrition: Development of a model to quantify the impact of climate scenarios on child undernutrition

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### Abstract:

**Background:** Global climate change is anticipated to reduce future cereal yields and threaten food security, thus potentially increasing the risk of undernutrition. The causation of undernutrition is complex, and there is a need to develop models that better quantify the potential impacts of climate change on population health. **Objectives:** We developed a model for estimating future undernutrition that accounts for food and nonfood (socioeconomic) causes and can be linked to available regional scenario data. We estimated child stunting attributable to climate change in five regions in South Asia and sub-Saharan Africa (SSA) in 2050. **Methods:** We used current national food availability and undernutrition data to parameterize and validate a global model, using a process-driven approach based on estimations of the physiological relationship between a lack of food and stunting. We estimated stunting in 2050 using published modeled national calorie availability under two climate scenarios and a reference scenario (no climate change). **Results:** We estimated that climate change will lead to a relative increase in moderate stunting of 1-29% in 2050 compared with a future without climate change. Climate change will have a greater impact on rates of severe stunting, which we estimated will increase by 23% (central SSA) to 62% (South Asia). **Conclusions:** Climate change is likely to impair future efforts to reduce child malnutrition in South Asia and SSA, even when economic growth is taken into account. Our model suggests that to reduce and prevent future undernutrition, it is necessary to both increase food access and improve socioeconomic conditions, as well as reduce greenhouse gas emissions.

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### Resource Description

#### Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES)

**Special Report on Emissions Scenarios (SRES) Scenario:** SRES A2

#### Communication:

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

# Climate Change and Human Health Literature Portal

## **Communication Audience:** ☒

audience to whom the resource is directed

Policymaker

## **Exposure :** ☒

weather or climate related pathway by which climate change affects health

Food/Water Security

**Food/Water Security:** Agricultural Productivity, Food Access/Distribution

## **Geographic Feature:** ☒

resource focuses on specific type of geography

None or Unspecified

## **Geographic Location:** ☒

resource focuses on specific location

Non-United States

**Non-United States:** Africa, Asia

**African Region/Country:** African Region

**Other African Region:** sub-Saharan Africa

**Asian Region/Country:** Other Asian Region

**Other Asian Region:** South Asia

## **Health Impact:** ☒

specification of health effect or disease related to climate change exposure

Developmental Effect, Malnutrition/Undernutrition

**Developmental Effect:** Other Functional Deficit

## **Intervention:** ☒

strategy to prepare for or reduce the impact of climate change on health

A focus of content

## **Mitigation/Adaptation:** ☒

mitigation or adaptation strategy is a focus of resource

Adaptation, Mitigation

## **Model/Methodology:** ☒

type of model used or methodology development is a focus of resource

Outcome Change Prediction

# Climate Change and Human Health Literature Portal

**Population of Concern:** A focus of content

**Population of Concern:** ☒

populations at particular risk or vulnerability to climate change impacts

Children, Low Socioeconomic Status

**Resource Type:** ☒

format or standard characteristic of resource

Research Article

**Socioeconomic Scenario:** Other Socioeconomic Scenario

**Other Socioeconomic Scenario:** Theory based model that accounts for both food access and socioeconomic conditions

**Timescale:** ☒

time period studied

Medium-Term (10-50 years)

**Vulnerability/Impact Assessment:** ☒

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content